**TECHNICAL INFORMATION PACKAGE**
**AUTOMATED SURFACE OBSERVING SYSTEM**

TABLE OF CONTENTS

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## SECTION 1 INTRODUCTION

1.1 Purpose - The purpose of the Automated Surface Observing System (ASOS) technical information package is to provide National Weather Service (NWS) personnel with engineering criteria pertaining to acquisition, installation and subsequent maintenance of NWS field equipment.

1.2 General - The National Weather Service (NWS) warning and forecast mission requires extensive use of electronic equipment for product dissemination, data acquisition and environmental monitoring. The NWS has purchased the ASOS, which collects weather data and provides accurate 24-hour accumulated weather reports to local observers; weather forecasters; airport personnel, including pilots and air traffic controllers; Federal Aviation Administration (FAA) and NWS personnel. The ASOS is a flexible system with a modular construction that allows deployment in a variety of configurations for operation with or without the attendance of an observer. The ASOS provides useful weather information in text, video, and audio format to a variety of users.

1.3 Installation Responsibilities - The contractor will provide facilities engineering services as required in support of the ASOS program. These services include installation, site redesign, structures, supports, utilities, cabling, lightning protection, grounding, and other power sources.

1.4 Installation Schedule - Field deployment of the ASOS began in mid 1991. The currently authorized base program encompasses 245 ASOS systems for the NWS, 537 systems for the FAA and 86 systems for the U.S. Navy. The NWS plans to provide systems for nearly all locations which have responsibility for surface aviation observations. A data base or hard copy with the installation schedules has been provided to each NWS regional ASOS focal point. Updates will be provided to the regions by the ASOS program office.

## SECTION 2 SAFETY GUIDANCE

2.1 Eye Safety - The CT-12K laser ceilometer is a Class 1 laser device when used within its normal operational conditions. This means that the CT-12K laser ceilometer in a field environment with instrument covers on poses no established biological hazard to humans. The following precautions are to be followed during service

and maintenance of the laser ceilometer. Only trained personnel should perform maintenance functions.

The CT-12K uses invisible laser radiation which may harm human eyes. Never look directly into the transmitter with magnifying glasses or binoculars. When operating, avoid prolonged exposure to the laser beam radiation.

2.2 Voltage Precautions - Maintenance personnel must observe all safety regulations at all times when servicing or repairing the ASOS. Do not replace components while the equipment is energized. Under certain conditions dangerous potentials may exist when power has been turned off. Be sure to check if batteries are in the circuit or charges are retained by capacitors. To avoid injury, always remove power and discharge and ground a circuit before touching it.

Because of the danger of introducing hazards, do not substitute parts or perform any unauthorized modifications to the equipment. Refer to the ASOS site manuals for specific safety information and precautions before repairing the ASOS.

## SECTION 3 MAINTENANCE AND LOGISTICS POLICIES

3.1 Maintenance Policies - NWS field personnel will maintain ASOS sites sponsored by both the NWS and FAA. These sites are to be maintained without distinction between an FAA or NWS site.

3.1.1 Maintenance Responsibilities - Upon acceptance of ASOS, maintenance and support will be provided by the ASOS Operations and Monitoring Center (AOMC), Regional ASOS Specialist (RAS), and ASOS Electronics Technicians (ET).

The AOMC monitors ASOS operations and contacts field offices when ASOS needs corrective maintenance.

The RAS provides regional coordination for the ASOS program and assistance for field maintenance staff.

The ASOS Ets are responsible for maintenance and repair of ASOS in their assigned maintenance area. The ET, after being informed of an outage, should proceed with the maintenance or repair action according to the assigned priority.

3.1.2 On-Site Repairs - The ASOS ET, after being notified of an ASOS failure, can dial the ASOS and check its status and perform various

maintenance functions without interrupting operations. In some instances this action could eliminate a visit to the site by reviewing and correcting the problem via a laptop computer.

The basic field repair will be to isolate the fault to a particular FRU by using diagnostics available in the ASOS. After isolating the fault, the ET will replace the FRU from the spares provided for on-site replacement and check for proper system operation. The failed FRU must be returned to NRC for repair.

3.1.3 Staffing Policies - The NWS maintenance staff for the ASOS will consist of 46 Ets who will specialize in ASOS maintenance most of their time. Other technicians will back up the ASOS technicians. The ASOS Ets will be based at locations chosen by the regions. Each ET will service approximately 20 sites, traveling to the sites via a provided van.

3.1.4 Maximum Outage Times - The ASOS equipment shall be restored to full operation within the times shown in the table below, with a consumer risk of 5 percent or less.

Priority 1. These are safety-related failures. They involve the following sensors and components.

Pressure
Wind speed and direction
Visibility
Ceilometer
Data collection platform
Acquisition control unit
Freezing rain occurrence (during periods when freezing rain can occur)

Priority 2. These are failures affecting flight operations and forecasting. They involve the following sensors and components.

Hygrothermometer
Liquid precipitation accumulation
Snow depth
Frozen precipitation water equivalent
Other forms of present weather
Operator interface devices (OID)*
Video display units
Controller video displays (CVD)**

* If no OID is working, the failure is priority 1.
** If fewer than half of the available CVDs are working, the failure is priority 1.

Priority 3. These are low priority failures. They involve the following sensors and components.

Snow depth (during periods when snow cannot occur)
Freezing rain occurrence (during periods when freezing rain cannot occur)
Sunshine switch
Printer

Maximum Outage Times

| TYPE AIRPORT | PRIORITY | OUTAGE TIME |
|---|---|---|
| MAJOR HUB * | 1 | 12 hours |
| | 2 | 24 hours |
| | 3 | 72 hours |
| OTHER TOWERED | 1 | 24 hours |
| | 2 | 36 hours |
| | 3 | 72 hours |
| SMALL | 1 | 36 hours |
| | 2 | 48 hours |
| | 3 | 7 days |

* Major hub airports are listed in Engineering Handbook 11.

Special Rules for Alaska and Hawaii. For ASOS sites in Alaska and Hawaii to which air travel is the usual mode of transportation, outage time starts at departure on the first available flight after the notification of outage. If a delay occurs due to weather, flight schedules (commercial or chartered), or space availability and the delay could result in excessive ASOS outage time, notify the AOMC immediately. The maintenance report shall include the excess outage time and actions taken to lessen the delay.

## 3.2 Logistics Policies

3.2.1 Station Spares - A complement of on-site spares will be supplied to each ASOS area. Interim Contract Support (ICS) for ASOS will be provided for 30 months by the contractor. When there is a failure at an ASOS site, the ET will identify the failed item and determine whether a spare is available in the maintenance support kit. When the spare is available, the ET will replace the failed item with a spare from the maintenance support kit and submit a routine requisition to NLSC per the instructions in Engineering Handbook (EHB) 1, Instrumental Equipment Catalog.

If no spare is available in CLS, the technician should call the Maintenance Assurance Section (W/OSO321), ASOS System Program Leader (SPL) during business hours. The SPL will coordinate with the ASOS

maintenance engineer and program office to get the required spare part from the contractor for direct shipment to the site.

3.2.2 Warranty - NRC is responsible for FRU tracking and determining warranty repairs. ASOS technicians will return failed items to the NRC with failure documentation attached as prescribed by Engineering Handbook 4, Engineering Management Reporting System.

## SECTION 4 DOCUMENTATION

4.1 Equipment Manuals - A set of maintenance manuals will be provided to each ASOS technician. The contractor will provide equipment manuals with site information tailored to each site.

4.2 Maintenance Schedule - Maintenance schedules for the LBC and H083 are in EHB-8, Surface Equipment. The interim maintenance schedule for ASOS is contained in the ASOS Site Maintenance Manual, volumes I and II.

4.3 EMRS Reporting - The equipment reporting code for the ASOS will be "ASOS". Report the activation of ASOS in accordance with procedures detailed in EHB-4. The deactivation of any equipment that the ASOS replaces is to be reported in accordance with procedures in EHB-4.

4.4 Engineering Handbook 1 - Ordering information for all ASOS parts can be found in EHB-1, section S. Parts for ASOS are listed with an Agency Stock Number (ASN) prefix of S100.

## SECTION 5 TRAINING

5.1 Formal Training - Maintenance training for ASOS is provided by the National Weather Service Training Center (NWSTC).

5.2 On-the-job Training - The initial installation and check-out procedures will provide maintenance experience for the ASOS technician. This experience, in addition to the procedures in the ASOS site technical manuals, will enable the ET to perform required maintenance and repair functions for ASOS.

## SECTION 6 ACCEPTANCE PROCEDURE

6.1 Installation - The contractor will install all ASOS components at each ASOS site. Work on the glide slope tower will be done under the supervision of FAA technical personnel.

6.2 Acceptance - Following installation, the contractor will perform a complete calibration and checkout of the ASOS including communications and tower displays. Upon successful completion of these activities, the contractor will conduct a formal system acceptance test for the Government. These tests shall ensure the correct installation and functioning of hardware, software, and communications. See the attached acceptance procedure.

## SECTION 7 SYSTEM PERFORMANCE VERIFICATION

7.1 Maintenance Terminal Use - Maintenance operations are performed from the Operator Interface Device (OID) or the Remote Maintenance Monitor (RMM). From either of these terminals, users can access the diagnostic program displays. The terminal can be used to change output assignments for sensors, parameters, message formats, communications port characteristics, and to enable and disable communications.

7.2 ASOS Performance Verification - The contractor will schedule and perform an operational demonstration for the Government. The contractor will notify the Government 14 days before the operational demonstration. Following acceptance of each ASOS system by the Government, the system will undergo a Government commissioning process for approximately 30 days of continuous operation before commissioning.

7.3 Troubleshooting Techniques - The ASOS can perform two classes of tests. A continuous self test checks the ACU, DCP, sensors, buses, peripherals and communications, etc. There are off-line tests for faults that cannot be detected by the on-line tests. Refer to the Site Maintenance Manual for information on fault isolation.

The OID displays error messages that identify the specifics of a failure. A maintenance log provides information on maintenance status of restoration of malfunctions to an FRU. The maintenance log is a useful tool for fault isolation. A technician can review the maintenance log and determine failures or suspected failures based on data quality checks or other self tests - the suspect FRU or sub-FRU will be identified.

The ASOS Site Maintenance Manual provides troubleshooting and corrective maintenance procedures for aiding maintenance personnel to quickly remedy any problem and return the system to operational status.

## SECTION 8 **MAINTENANCE AIDS**

8.1 Support and Test Equipment - The ASOS pressure sensors require a verification check every 6 months or when a sensor is replaced for corrective maintenance. The ASOS sensors will be checked against the Paroscientific pressure transfer standard model 760-16b. The procedure for the verification is described in detail in the ASOS site maintenance manual, volume II. Once a year, a replacement transfer standard will be issued from the national pressure calibration lab at NWS Headquarters. The out-of-date transfer standard will be returned to the NWS calibration lab.

8.2 Remote Maintenance Monitoring - There will be 12 complete Remote Maintenance Monitoring (RMM) systems delivered to the NWS. The RMM equipment is described below.

Dell System 200 PC/AT
640 KB RAM
20 MB Hard Drive
1.44 MB Floppy Drive
VGA Monitor
DOS 3.3
Dbase IV 1.1
Framework III
Modem 2400 Baud

Lot 1 RMM equipment was sent to the Southern and Central Region Headquarters, NWSH, and NWSTC.

There is no national maintenance program for the RMM equipment. Each user of the equipment is responsible for maintenance and repair of the equipment. Funds are allocated to the regions for maintenance and repair of this equipment.

W/OSO321:BGMcCormick:rhz:1/22/92
disk EHB 6,7,10,11,12,13   "asospack.tip"

WP5.1 Speller